CENTRO DE MATEMÁTICA
UNIVERSIDADE DO PORTO

Seminar on Semigroups, Automata and Languages

Friday, December 6, 2024, 14:00

Online Zoom Meeting

Ruiwen Dong

Magdalen College, University of Oxford

Submonoid Membership in n-dimensional lamplighter groups and S-unit equations

The Submonoid Membership problem in a group G asks, given a finitely generated submonoid M of G and an element g of G, whether g is contained in M. In many other decision problems (such as Subgroup Membership and Rational Subset Membership), decidability is preserved under finite extensions of the group G. In contrast, decidability of Submonoid Membership in G is not known to imply its decidability in finite extensions of G. In fact, in this talk we will give the first counterexample to this: we construct G as a quotient of the 7-dimensional lamplighter group, so that Submonoid Membership is decidable in G but undecidable in some finite extension of G (Shafrir 2024). We will show decidability of Submonoid Membership in quotients of n-dimensional lamplighter groups, by reducing it to solving '"S-unit equations" in modules over rings of prime characteristic. We extend Derksen's idea of showing that the solution sets of these S-unit equations are effectively p-automatic, using a combination of automata theory, commutative algebra and number theory.

This session will be held in the following Zoom link:
https://fc-up-pt.zoom.us/j/85665346562

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

COMPETE · QREN · UNIÃO EUROPEIA

Com o apoio do projeto UID/MAT/00144/2021